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Securing the embeddedness of psychosocial diffusion indicators into the Turkish construction industry: silence is no longer golden

Purpose

To investigate employee stakeholder engagement on business performance. A psychosocial approach was used to evaluate employees' perception and role engagement on organisational performance, cognisant of: strategy development; leadership; fiscal acuity; employees' skills, empowerment; supply chain relationships; external stakeholders and wider societal beneficiaries.

Design/methodology/approach

This research is context-bound to the Turkish Construction Industry. Findings generated from literature established a set of evidenced-based priorities for further investigation. A case study approach was conducted with three large Architecture, Engineering and Construction (AEC) organisations to define psychosocial diffusion indicators and priorities for future uptake.

Findings

Initial findings on psychosocial diffusion indicators and their impact on business performance are presented through a psychosocial diffusion model. Three interconnected facets are proffered for future uptake: Capability (Responsiveness); Capability (Flexibility); and Capability (Competence).

Research limitations/implications

Findings are exclusively bound to the sample frame in question. No attempt has been made to undertake detailed cross-analysis/correlation to support internal/external consistency, validity or reliability.

Practical implications

Organisations are able to reflect on their core business strategy to appreciate how psychosocial diffusion can be operationalised.

Social implications

This work impinges on social factors embedded within (and across) organisational boundaries, including the AEC supply chain. It also relates to employer/employee relationships, psychological functioning and employee well-being.

Originality/value

Originality rests with the identification of construction-related psychosocial indicators. It contributes to the wider body of knowledge on embedding psychosocial indicators into organisational systems and processes, adding further insight into systems thinking and business transformation.

Keywords: Business Strategy; Performance; Diffusion Approaches; Innovation; Psychosocial Indicators

1. INTRODUCTION

The Architecture, Engineering and Construction (AEC) sectors are major contributors to the world's economy. In the UK alone, this contribution exceeds £110 billion per annum. However, despite this significance, AEC has been continually criticised for high levels of fragmentation, poor productivity/efficiency, and very low levels of innovation. In contrast, (seemingly) better performing industrial sectors such as aerospace, the pharmaceutical sector, petrochemical industry and other technology-laden industries seem to do much better. The question is why? In simple terms, AEC sector-wide challenges include a raft of issues, from stifled intransigent barriers associated with socio-political and cultural drivers (entrenched positioning), through to changing societal behaviour, increased client demand, cyclical economic pressures, risk, and supply chain dependencies. In summary, AEC has been continually identified as underperforming (Latham, 1994; Egan, 1998; Fairclough, 2002; Cain, 2004). It has also been challenged to change.

Proponents will no doubt advocate that Building Information Modelling (BIM) has helped improve and streamline systems and processes; but the technology itself has (in some cases) also acted as a barrier, particularly in smaller organisations where investment and knowledge of technology such as BIM has impeded or stifled progress and innovation due to a lack of appropriate skills/knowledge. Thus, the actual process of technology diffusion (and management thereof) is a significant challenge; as this in particular has a direct impact on a number of business streams, not least: organisational employees; supply chain partners; external stakeholders; and wider societal beneficiaries. Coincidentally, Davenport (1993) explored some of these issues, highlighting the need to secure process innovation through information technology. Allied to this is the actual technology diffusion process itself – specifically, how this is managed in AEC, as evidence suggests that this is ostensibly leveraged through parochial, fragmented, and seemingly unmanaged systems/processes. A good example is Information Communication Technology (ICT), as “ICT application deployment is primarily about people related issues of effective change management, knowledge transfer and leadership by a champion and adoption team to sell benefits and support users” (Peansupap and Walker, 2006). The corollary of this is that failure to address these issues not only stifles progression, but also influences organisations' ability to: compete; be innovative; respond to market drivers; and marshal skills/competence to deliver organisational goals.

Cognisant of the above, organisational [business] performance can be broadly categorised into a series of complex, systems, procedures and forces. These includes a number of factors, not least: strategic decisions and trajectories; management/leadership direction; fiscal acumen; organisational intellectual capital (employees); organisational structure; supply chain partners' dynamics; and tacit knowledge of the wider societal beneficiaries. Anecdotally, the term “synergy” is often used, where “the whole is greater than the sum of its parts” (Aristotle, n.d.). From an AEC business perspective, it is argued that although AEC organisations strive to achieve performance improvement (as with other business sectors), more often than not they fail to truly appreciate or acknowledge the psychosocial factors that can also affect performance. These factors are significant and pervasive. They predominantly include two main drivers: people and place [context] – which includes “well-being”; and psychological factors akin to the environment and employees' ability to function within this. Acknowledging these issues, this paper presents initial findings on psychosocial diffusion indicators and their impact on business performance.

2. SECTOR CHALLENGES

Recurrent AEC challenges continue to prevent efficiency gains, productivity and innovation – either incremental, radical or breakthrough. These challenges have been well-reported in extant literature

(Winch, 2000), and are significant, palpable and real. Whilst these challenges differ from company to company (and country to country), the root causes are principally enshrined in 'traditional' thinking and concomitant processes, and subsequent actions organisations take. However, some companies are now starting to "think outside the box", and are aligning themselves for the next transition. This includes reimagining (or some might say "re-imagining") the corporate vision and mantra to be different from the rest (organisational distinctiveness). Given that growth reports are particularly promising – see for example Global Construction 2030 (Global Construction Perspectives Limited and Oxford Economics Limited, 2015), there is now a real need to take these issues seriously. This may sound somewhat simplistic and pseudo-patronising, especially considering the analogy of "easier said than done". However, these underlying challenges directly affect performance, productivity, and profitability. At this juncture, it is useful to reflect for a moment on the wider parameters and interplay; where SAP (Systemanalyse und Programmentwicklung), identified four main challenges facing the construction sector; these being: Challenge #1: Poor productivity and profitability; Challenge #2: Project performance; Challenge #3: Skilled labor shortages; and Challenge #4: Sustainability concerns (D!igitalist, 2016). Other media sources identify similar issues, such as: i) Shortage of qualified workers; ii) Generational differences; iii) Technology adoption; iv) Environmental sustainability; and v) Project complexity (ESUB, 2016). Notwithstanding subtle differences, terms of reference or emphasis, for the purposes of this paper, these challenges are loosely coupled and labelled for convenience into three broader headings of "Industry Complexity", "Sector Skills, Technology and Agility", and "Psychosocial Diffusion Impact" for further discussion.

2.1 Industry Complexity

AEC stakeholders typically include a range of differing professions, from architecture/design, through to manufacturing/production, engineering and construction. These boundaries and delineations are soft and permeable – reflecting the 'open systems' philosophy. Given this, interchange, dialogue, communication patterns and levels of understanding generally prevent 'full' understanding or appreciation of sector-specific nuances. A further layer of complication adds to this complexity when culture (individual/organisational/sector) is added into the equation. This unique blend of disparate stakeholders and positioning seems to be somewhat 'hard-wired', entrenched and pervasive – the essence of which does not naturally tease out synergy, nor does it cultivate or encourage innovation. Some of these factors have been explored in depth, and some have yet to be uncovered. A good starting point is to reflect on the findings of Blayse and Manley (2004) who noted that the main factors that influenced innovation were: (i) clients and manufacturers; (ii) the structure of production; (iii) relationships between individuals and firms within the industry and between the industry and external parties; (iv) procurement systems; (v) regulations/standards; and (vi) the nature and quality of organisational resources.

Reflecting on these issues today, it is interesting to note that things do not seem to have changed - see early reports by Emerson (1962); Latham (1994); Egan (1998). Perhaps AEC is in a continual torus, with no 'tangible' end in sight? But then again, perhaps there is light at the end of the tunnel? Although industry complexity remains, new innovation opportunities are continually being uncovered (Akintoye *et al*, 2012); including the need to model ICT to leverage innovation (Xue *et al*, 2017). On this issue, "While innovation within such a large industry as the construction industry might be considered by some as overwhelming and a daunting task, it should be recognised that innovation can occur at all different levels." (Gambatese and Hallowell, 2011). Similarly, it is also important to acknowledge that the "...pattern of couplings in the construction industry favouring project efficiency is clearly an obstacle to innovation and learning" (Dubois and Gadde, 2002). A

caveat of caution is therefore raised at this juncture – the need to understand technology (and innovation together), especially how aligned congruence can be used to transform organisations (from a strategic direction standpoint/trajectory) to deliver competitive advantage. Similarly, this also requires the right type and level of skills (competence) to make this transformation happen.

2.2 Sector Skills, Technology and Agility

Whilst sector-specific skills required for delivering business goals can be somewhat transient and fluid, the real challenge is to harness skills and technology through organisational structures, systems and processes to deliver capability. Given this, BIM and the digitisation of processes has evidenced some significant pockets of success in this area. BIM is just one example - there are many others. However, increased client expectations, and the need to secure cost and production efficiencies using smart technologies, advanced strategies and streamlined processes require new skill sets in order to continue to drive the 'improvement' agenda. In addition, globalisation and the rate/pace of change is also a significant lever for organisations to contend with. The corollary of this is that AEC now needs to fervently manage the impact of these changes on the technical/professional skill and roles, along with the underpinning structures and processes that deliver services. This resonates with thinking on the knowledge economy and the projected fourth industrial revolution (Industry 4.0). Skills profiles are continually changing and evolving – within the sector they are increasingly coalescing around new/emerging areas of knowledge underpinning technologic solutions. Organisations are now investing in new recruitment strategies, which requires a change from traditional 'silo-based' approaches to skills and professional disciplines to those which are more readily able to engage new ways of thinking, working and behaviour. Understanding these issues can help organisations harness intellectual capital (people/skills) in new innovative, flexible and productive ways. Moreover, it allows them to think differently, insofar as their skill base can be seen as a fluid and agile resource for alignment with client demand. On this theme, intra and inter-industry learning is increasingly being used to evaluate new business discovery patterns and innovation opportunities. Several showcase exemplars from non-cognate industries have exploited this to harvest an innovation premium (Forbes, 2016).

From an AEC perspective, increased investment is needed in research and innovation (UK Commission for Employment and Skills, 2013; Hampson *et al*, 2014), especially considering Return on Investment associated with BIM (Azhar, 2011). Given this, the development of skills within an organisation is exceptionally important, as skills are often seen as a key company differentiator. However, there is still a general perception that there is a “....general failure among training providers to keep pace with technological change within the industry....” (McGuinness and Bennett, 2006). Similarly, whilst advocates proffer that design, construction and manufacturing are becoming more intelligent, integrated and automated (Akintoye *et al*, 2012), a caveat of caution needs to be noted, particularly concerning the wider impact on strategy, knowledge management, and emerging technologies (Goodman and Chinowsky, 1997). This places a requirement on organisations to understand how technology is harnessed, embedded and diffused within organisational settings. This resonates with the need to evaluate technology with management practices – as, “Fundamentally, the competitiveness of construction SMEs depends on the basic role of the owner/manager, intangible investment (intellectual capital), tangible investment in information and communication technology, and strategic capability (ability to be innovative and adapt to change)” (Love and Irani, 2004).

2.3 Psychosocial Diffusion Impact

The term “psychosocial” is often used to describe the complex interrelationships of social factors with the individual thoughts and behaviour of people. Many definitions exist, although within the context and scope of the AEC business environment, this can be seen to include social factors embedded within (and across) organisational boundaries such as the supply chain. This naturally embraces the rich cultural diversity of functional roles, responsibilities and perception of people within the workplace. These issues are seldom fully explored regarding their impact on organisational success. This impinges on several interrelated areas, including such issues as employer/employee relationships (Dainty *et al*, 2004), stress on employees (Meliá and Becerril, 2007), psychological functioning and well-being (Toor and Ofari, 2009), and also has an impact on Health and Safety (Lunt *et al*, 2008).

Given the above discourse on sector challenges and the need to continually improve, AEC has often been described as somewhat unique insofar as it produces “one of a kind” products that are generally bespoke to a client’s requirements. Therefore, contemporaries often cite that both product and process repetition is relatively low (in comparison with other sectors such as manufacturing), and that change (to mirror organisational success in other sectors for example) is therefore difficult to replicate. This is often somewhat of an anathema or deterrent for taking the appropriate steps needed to fully understand the type and level of change required. The authors proffer that this in turn impinges on the level of understanding needed – not just on the perceived changes needed *per se*, but on the wider organisation, which includes infrastructure, skills, and full appreciation of the psychosocial factors which can influence success. Using innovation as an exemplar; this has often been cited as a real differentiator of organisations, with the ‘innovation premium’ helping to separate better performing companies – as more often than not the diffusion of innovation can be seen as a central tenet of success (Rogers, 2003). Moreover, innovation diffusion within an organisational environment is an important part (determinant) of transformation (Zhu *et al*, 2006). On this theme, from an AEC perspective, several studies have provided significant advantages of innovation diffusion (Blayse and Manley, 2004; Peansupap and Walker, 2005; Kale and Ardit, 2010).

From a company financial performance perspective, psychosocial diffusion or impact analysis has not been fully evaluated within AEC. Perhaps this is due in part to the variability of contemporary business models (being highly subjective and difficult to replicate); where the type, structure, operating markets and organisational systems vary so significantly. However, financial performance is a critical component of business performance and survival. It involves several unique variables, including the need to fully understand management practices and processes (Maes *et al*, 2005). There is also a need to understand how corporate planning aligns to financial budgeting (Kaka and Price, 1994); where stakeholder engagement is an important part of this process (Lützkendorf *et al*, 2011), as is the need to engage risk (Annamalai and Jain, 2013). These issues also relate to other areas, including Organisational Learning (Argyris and Schon, 1978; Senge, 1990; Huber, 1991). Organisational Learning (OL) is based on organisational development and organisational theory, the notion and premise of which structures the collective actions of individuals to improve organisational knowledge. The generic terminology of OL typically embraces ‘adaptive’ and ‘institutional’ learning, and can also envelop contemporary ‘behavioural associationist theories’ and ‘cognitive organisational theories’ (Huber, 1991; Watkins and Marsick, 1992). This relates to numerous improvement initiatives, including Senge’s (1990) five disciplines (systems thinking, personal mastery, mental models, shared vision and team learning). In summary, within AEC it is widely acknowledged that there is still a need to change. This includes a range of initiatives, from the need

to develop an OL culture (Kululunga *et al.* 2001), through to the need to fully understand the impact of psychosocial diffusion, functioning and well-being (Toor and Ofari, 2009; Goleman *et al.*, 2013; Wheatley and Goulding, 2016; Leung *et al.*, 2016).

2.4 AEC Challenges in Turkey

AEC in Turkey has shown steady growth across a number of principal markets – from housing through to retail, leisure and infrastructure. The construction sector alone employs 1.5m people and accounts for 6% of Gross Domestic Product (Novron, 2017). Issues and challenges typically mirror the global changes facing other countries and contexts. For example, client drivers and the need to embrace new technology and systems to support efficiency gains and process improvement. Other challenges include the impact of BIM, as comparisons with the UK have evidenced increased awareness and the need to further leverage technological solutions to support core business operations (Isikdag *et al.*, 2009; Ezcan *et al.*, 2013). Equally however, there is a need to be aware of preventative barriers linked to “organizational structure and culture” (Aladag *et al.*, 2016). These issues and sector-specific Turkish AEC challenges resonate with Isikdag *et al.*, (2009) who identified the need to investigate the strategic importance of technology, especially the training needed to operationalise and deliver successful transformational strategies. However, at this juncture it is important to also recognise the impact of leadership in this transformation, especially its link to innovation (Lai, *et al.*, 2016), culture and corresponding interplay with organisational performance (Giritli *et al.*, 2013). Culture is openly acknowledged as one of the main issues which can impede or stifle organisation success - where Albayrak and Albayrak, (2013) proffered that “... firms should keep pace with changes in the external environment as well as they should have cultural characteristics that are compatible with internal environment.”

In summary, the importance of intellectual capital and its interrelationship to competitiveness and innovation within Turkish AEC firms is essential (Yitmen, 2011). This not only requires the industry to “... differentiate itself in two ways, namely “product variety and speed” and “quality and image” (Budayan *et al.*, 2015), but also the need to recognise that conjoined synergies require many issues to be brought together to: i) create mechanisms for increased awareness; and ii) establish viable conduits for generating verifiable evidence-based solutions for future uptake. For the purpose of discussion in this paper, these issues are loosely coupled into the term “capability”, where capability is the sum total of industry complexity, strategic orientation/positioning, and stakeholder engagement. Given this, it is proffered that organisational capability can be influenced by not only understanding the strategic capability of organisations, but also realigning (positioning) the psychosocial diffusion factors needed to meet current and future organisational need.

3. RESEARCH METHODOLOGY

The philosophical underpinnings of this work stem from an earlier study by Ezcan *et al.*, (2015) on agility and technology diffusion. This paper investigates how Turkish AEC organisations approach organisational performance in relation to employees’ input on strategy/leadership, resources, use of tacit knowledge, and engagement with wider societal beneficiaries. In this respect, it was important to capture the psychosocial factors that impinged on decisions (Holloway and Jefferson, 2012). A research methodological approach was therefore needed which captured the psychosocial dynamics of AEC organisations, particularly cognisant of place and context and the interdependencies that often affect organisational performance. This impacts on the overall understanding of factors and mechanisms that affect organisational behaviour. Given this, an interpretivist approach was adopted which engaged actors’ perception, experience and understanding of ‘objective reality’ within the Turkish AEC setting. Acknowledging this, interpretivist discourse (Denzin and Lincoln, 1995; Willis,

2007) helps place philosophical context, which is often required when engaging employees' tacit knowledge and experience. More importantly perhaps, is to appreciate that the "inquirer must elucidate the process of meaning and clarify what and how meanings are embodied in the language and actions of social actors" (Love et al, 2002). This is also important when contemplating generalisation in interpretive research (Williams, 2000). From an epistemological perspective, the choice of adopting interpretivism was also informed by the need to integrate the human (people) element into the study. Whilst it is accepted that interpretive researchers' perception of 'reality' (accepted/socially constructed) is often made through social constructs such as perception, language, context, consciousness, shared norms etc., the challenge in this research was to gain evidence of thinking (rationale) behind decisions. Given this, a multiple-case study approach was adopted which engaged a "close-bounded" research lens [Turkish contractors with international market penetration/reach]; where these organisations had direct experience of both home and international markets (residential, infrastructure, energy, etc.), and possessed experience of people/change diffusion. In furtherance of this, a multiple-case design was adopted as part of the research methodological design, rather than a single case approach. This decision was taken in order to develop a more detailed in depth understanding of the phenomena (Chmiliar, 2010). Three case studies were selected using purposive sampling "literal replication" (Fletcher and Plakoyiannaki, 2010; Yin, 2013) and within-case analysis, cognisant of heterogeneity and replication across all three cases. Details of these three case studies can be seen in Table 1.

Insert Table 1 here.....

Ten participants were selected from each of these three case study organisations, reflecting three specific fields of expertise: Top Management (Board of Directors, Chief Executive Officer, General Manager, Managing Director, President, etc.); Middle Management (Department Heads, Branch Managers, Junior Executives, etc.); and First Line Management (Senior Engineers, Architects, Surveyors, Technicians working under Middle Management) – the distribution of which can be seen in Table 2. The target sample rationale was to capture 'representative' stratified data from three management layers (tiers) across three separate companies. A combination of both purposive and convenience sampling was used to select participants, cognisant of appropriateness, alignment, availability and individual agreement.

Insert Table 2 here.....

Table 2 presents 30 participants used in this study, representing three different management levels across the three case study organisations. These participants were invited to share thoughts and experiences through face-to-face interviews using structured questionnaires as instruments for not only providing heterogeneous content *per se*, but also for facilitating greater clarity in the subsequent coding and analysis phase. The questionnaire constructs were designed to capture the psychosocial factors which were perceived to directly/indirectly affect organisational performance (Figure 1). In this respect, the challenge here was to examine actors' views and perceptions – specifically, their tacit knowledge and experience. Acknowledging the different terminologies associated with "actors", "participants", "respondents", and "subjects"; hereafter, the term "respondent" is used throughout. This definition not only aims to provide additional clarity, but also

seeks to strengthen the classification and sampling approach of respondents used in surveys of this nature (Gideon, 2012).

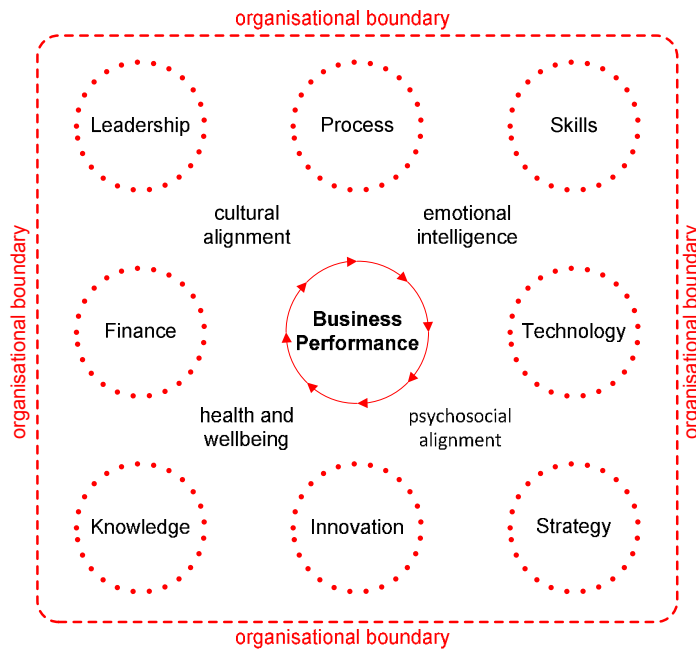


Figure 1. Psychosocial pervasiveness parameters

Figure 1 shows that the central core [Business Performance] is a product of several factors/drivers, not least the mix, alignment and orientation of resources and strategy to support and underpin this. This arrangement follows a systems thinking approach (Sterman, 2000), where organisational performance is seen as a product of internal structure, operating policies, resources and leadership (to name but a few). However, for the purposes of this paper, the remit is widened slightly to include psychosocial factors, particularly the drivers which have been seen to directly/indirectly affect organisational performance. These issues include how organisational structures are managed and governed, the management/organisational arrangements and coordination, cultural orientation, specific social interactions, health and well-being, emotional intelligence, societal dynamics etc. This also includes the extent to which psychosocial risks are incorporated into strategic risk management practices (MacBride *et al*, 1981; Langenhan *et al*, 2013).

Respondents were asked to rate the level of existence of the given criteria based on a scale of 1-5 (where 1 = low, and 5 = high). From an analysis perspective, a relative importance ranking of the variables were established. This approach has been successfully used in recent Construction Management Research (Monozam *et al*, 2016; Rao *et al*, 2016; Hadidi *et al*, 2017). Proponents may advocate similarities with the logic of ranking, as these have been presented in different names that reflect their application such as; Relative Importance Index, Severity Index, Relative Agreement Index, etc. (Chen *et al*, 2010; Chileshe and Dzisi, 2012; Holt, 2014). In this context however, based on the application, the purpose here was to determine and ascribe priorities in this research through the term Relative Existence Index (REI). Where REI was determined using the following formula (EQ1), which was adapted from Chen *et al*, (2010).

Relative Existence Index (REI)

$$= \sum_{i=1}^5 \left(\frac{\omega_i f_i}{a.n} \right)$$

- i = scale anchor point given to each criterion by the respondent (*ranging from 1 to 5*)
- ω_i = weight for each point (*rating in scale of points, from 1 to 5*)
- f_i = frequency of the point i by all respondents
- n = total number of responses
- a = highest weight (5 in this study)

EQ1 Relative Existence Index

The aim of this analysis was to prioritise the weak points that needed attention. The results of the analyses were ranked, from negative to positive existence. In this regard, the parameters with low REI values were deemed areas that needed primary attention. However, where two or more factors had the same score, the one with the lowest standard deviation was assigned the highest importance ranking (Chileshe and Dzisi, 2012). If they also had the same standard deviation, they shared the arithmetic mean of the ranking they occupied.

4. RESEARCH FINDINGS

Respondents were asked to share their perception on the REI across a number of areas identified in Figure 1. These were then coded into structured questionnaires. A total of 30 respondents' views were captured from three organisations (Table 1), using three different layers of management (Table 2). This arrangement was adopted in order to unpick differences in thinking, where for example the values and perspective from one level may have a common view on some of issues, but may differ in other areas due to differences in management/seniority levels. Table 3 presents the ranking and REI findings from Top Management (TM), Middle Management (MM) and First Line Management (FLM).

Insert Table 3 here.....

Table 3 identifies the ranking and REI from TM, MM and FLM. From this, it can be seen that the top three main factors that were perceived to have the greatest impact on organisational performance capability were: Rank 1 "Ability to make tough decisions quickly" {0.633 combined REI}, Rank 2 "Ability to implement a recovery plan" {0.667 combined REI}, and Rank 3 "Ability to analyse the potential risks of change on the organisation" {0.707 combined REI}. The factors perceived to have the least impact on organisational performance capability were: Rank 32 "Ability to improve staff skill, knowledge and attitude towards new technology" {0.920 combined REI}, and Rank 31 "Ability to develop powerful external communication" {0.893 combined REI}. Given these findings, Table 4 presents the Mean Score, Standard Deviation and REI findings from TM.

Insert Table 4 here.....

Table 4 identifies the Mean Score, Standard Deviation and REI Findings from TM. The top three main factors perceived to have the greatest impact on organisational performance capability were: Rank 1 “Ability to make tough decisions quickly” {0.633 REI}, Rank 2 “Ability to implement a recovery plan” {0.700 REI}, and Rank 3.5 is shared by “Ability to analyse the potential risks of change on organisational resources” and “Ability to quickly reorganise the resources in sudden change” {0.767 REI}. Conversely, the factors perceived to have the least impact on organisational performance capability were: Rank 32 “Ability to improve staff skill, knowledge and attitude towards new technology” {1.000 REI}, and Rank 31 “Ability to improve top management’s knowledge about new technology” {0.967 REI}. Acknowledging these results, Table 5 presents the Mean Score, Standard Deviation, and REI findings from MM.

Insert Table 5 here.....

Table 5 identifies the Mean Score, Standard Deviation and REI Findings from MM. The top three main factors perceived to have the greatest impact on organisational performance capability were: Rank 1 “Ability to make tough decisions quickly” {0.667 REI}, Rank 2 “Ability to implement a recovery plan” {0.683 REI}, and Rank 3 “Ability to provide solutions within optimum time and cost difference in sudden change” {0.717 REI}. However, the factors perceived to have the least impact on organisational performance capability were: Rank 32 “Ability to develop a diffusion programme for new technology” {0.900 REI}, and Rank 30.5 is shared by “Ability to improve staff skill, knowledge and attitude towards new technology” and “Ability to develop a powerful external communication” {0.900 REI}. Finally, the last set of findings represent FLM, where Table 6 presents the Mean Score, Standard Deviation, and REI results.

Insert Table 6 here.....

Table 6 identifies the Mean Score, Standard Deviation and REI Findings from FLM. The top three main factors perceived to have the greatest impact on organisational performance capability were: Rank 1 “Ability to make tough decisions quickly” {0.600 REI}, Rank 2 “Ability to encourage staff to use new technology” {0.600 REI}, and Rank 3 “Ability to analyse the potential risks of change on organisational resources” {0.633 REI}. The factors perceived to have the least impact on organisational performance capability were: Rank 32 “Ability to develop powerful internal communication” {0.933 REI}, and Rank 30.5 shared by “Ability to improve staff skill, knowledge and attitude towards new technology” and “Ability to develop a powerful external communication” {0.900 REI}.

5. DISCUSSION

The first point highlighted for discussion is the distribution and perception of respondents’ views on the REI values. On the whole, respondents’ views coalesced, albeit some noticeable differences were observed in some instances. These deviations were probably a corollary of management function/seniority, and individual exposure to the psychosocial factors identified in the questionnaire design. From the outset it was accepted (as part of the underpinning rationale of the research design) that all three levels of seniority may have a common view on some of the issues. Conversely, it was also accepted that wide disparities may also be evident (given the priorities, task descriptors and level of understanding between the 30 respondents). Thus, the following discussion accepts that

respondents' views and perception are subjective and grounded in contextual roles (function) and concomitant seniority. For the purposes of generalisation, only 'normalised' findings are discussed hereafter, where the three case study findings are combined into one discourse, rather than discussing each case study findings individually. The rationale for this is two-fold, i) it provides readers with a combined view of management perception at the three different layers, so that 'like' levels can be aggregated, and ii) that this approach minimises individual skew often associated with small sample sizes within each case study data set.

From an organisational capability perspective, vis-à-vis an organisation's ability to make tough or difficult decisions quickly, this area seems to secure almost complete consensus across the three levels (TM: 1, MM: 1, FLM: 1). These findings indicate that problems are often entrenched, and solutions require considerable reflection or additional effort to resolve. This also indicates that there may be problems with vertical communication, insofar as the collective efforts are not sufficiently streamlined to deliver conjoined solutions. Upon deeper analysis of the underlying issues, it transpires that whilst decision making processes were somewhat slow and stifled, especially concerning roles, responsibility and communication conduits; TM's riposte noted the need to fully appreciate the precise area of contention in order to ensure thoroughness and complete evaluation. The challenge presented here therefore concerns consistency, clarity of roles and communication channels.

Regarding the provision and implementation of recovery plans, the general belief from respondents was that these needed to be firmly enmeshed within organisational procedures and systems, with clear protocols for implementation. However, all three case study organisations acknowledged the need for these, but no firm recovery plans were seemingly event (TM: 2, MM: 2, FLM: 4). The key learning point from this is the need to establish connectivity to policies, strategy and risk mitigation registers. This resonates with the next finding on change, and the subsequent impact of change on organisations. Respondents acknowledged the need for change, and the impact of not applying change to their respective organisations. However, risks were perceived slightly differently from the three management tiers (TM: 3.5, MM: 5, FLM: 3). TM noted that the impact of change was evaluated from a reactive position, where the assessment was conducted purely on prior experiences of managerial knowledge, rather than defined procedures and collective thought. This laissez faire approach was observed by lower tiers, with FLM noticing the absence of such approaches. MM and FLM observed the importance of this, especially on the impact of people, as the people-side of change was rarely recognised. This highlights the need to embrace change as a holistic integral process, where the people-side of change intercedes with process, technology and organisational culture. It also directly impinges on the psychosocial diffusion factors associated with systems dynamics and organisational transformation. Typical indicators supporting this, include the need to include mechanisms for engaging staff with new technology (TM: 11.5, MM: 11, FLM: 2), where in some cases FLM observed that TM expected staff to use technology in the workplace "...since it is a part of their job and so their responsibility"; but that they were unaware what was actually needed. This links to change, as there was general consensus of the need to quickly reorganise the resources in sudden change (TM: 3.5, MM: 6, FLM: 5), but that this not only faced cost implications, but was also difficult to predict. Similar issues prevailed when considering the need to provide solutions within optimum time and cost differences in sudden change (TM: 6, MM: 3, FLM: 15.5, Tt: 6). Where TM and MM felt that this should be driven by organisational strategy, rather than through organisational competence. This oxymoron is further compounded by procedural challenges which impinged on quality and corporate reputation. Clarity of thought on defined procedures was a key learning point in this respect.

From a skills perspective, there was clear agreement across the three management tiers on the need to support and develop skills (in line with organisational need). This recognition was also linked to communication, and the need to clearly articulate vision and ownership of direction. This not only embraces change and organisational culture, but also the central tenets of shared and collective ownership. This seemed to be a pivot point of contention, as there was a counterbalance of thought on the desire to change or alter something if it worked. These issues resonated in the majority of findings, and reflected the need to have more clearly defined processes and mechanisms in place to contain and address policy and strategy decisions. These sorts of issues also had a direct impact on organisational culture, as there was a distinct need to foster a collaborative environment which supports this (TM: 11.5, MM: 13, FLM: 10). This also links with individual and collective well-being, which is a fundamental psychosocial diffusion indicator, where respondents noted that strategic vision did not really embrace staff. There was a need to acknowledge a number of factors, from career development, through to retention and succession planning. There was a distinct acknowledgement of this from central headquarters to operational experiences on site. Communication, culture and process are key learning opportunities that need to be captured, refined and embedded.

Leadership and management was acknowledged as having a central part to play in organisational direction. This included communication and delegation, and dissemination of policy and strategic direction. For example, the process of authorising staff to make decisions in cases of sudden change had nearly the same level of importance for both TM and MM levels, yet TM advocated that staff were not willing to take responsibility. Conversely, FLM felt that this was a communication issue and failure of senior management to imprint or demonstrate leadership commitment through appropriate action, citing "...the ones that want to hold the power do not choose to delegate responsibilities...which impacts on teamwork and trust...". This is another corporate culture matter which impinges on change (TM: 11.5, MM: 8, FLM: 22), but also on other issues such as innovation (TM: 29, MM: 16.5, FLM: 7). Another exemplar of this divide was the difference of opinion between the lack of awareness of technology (between the three tiers), and how the innovation premium could be leveraged.

In summary, the results presented in Table 3, Table 4, Table 5 and Table 6 present different thinking and insight from three respondent sets across the three case study domains. The quantitative data and qualitative descriptors provide new insight into organisational dynamics and thinking, particularly the need to have the right staff (employees) in place to create maximum flexibility to meet market demand. This resonates with many similar studies on capability and alignment of skills. For example, Drejer, (1996) noted that skills and competence levels were crucial for delivering organisational success; more notably perhaps (in the context of this study) is the interplay and relationship of skills and performance to the organisational context (Klein et al, 1991; 1998). The impact of psychosocial diffusion factors on organisational performance is another important area for deeper analysis. For simplicity, this can loosely be coupled into three core dimensions: i) the need to be responsive (to compete in the business environment); ii) the need to be flexible and agile (to compete in the business environment); and iii) the need to have appropriate competence in place (to compete in the business environment) – see Figure 2.

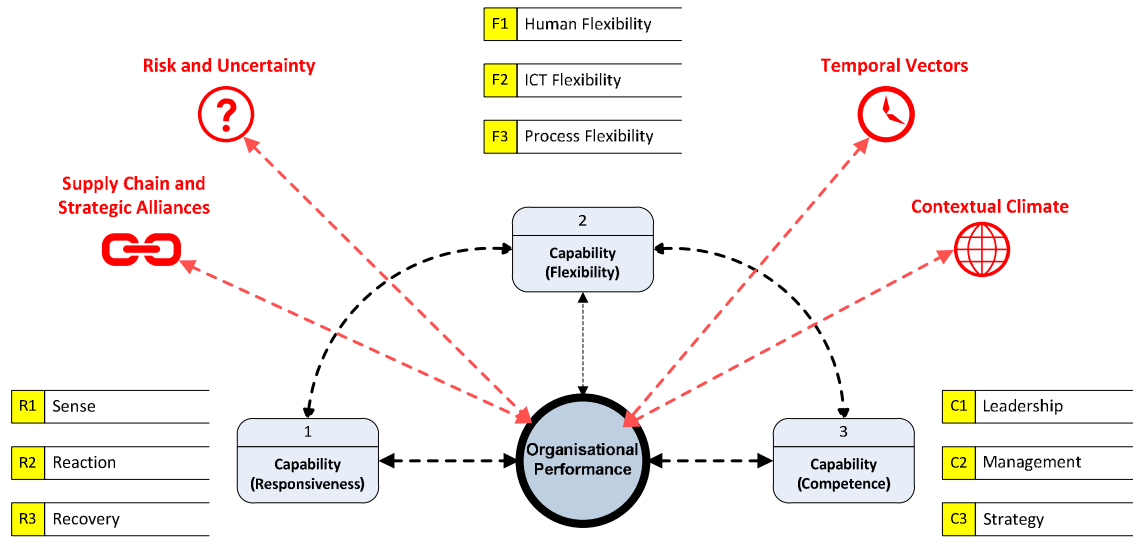


Figure 2. Organisational psychosocial performance diffusion factors

From Figure 2, it can be seen that the central core [Organisational Performance] has three main dependencies: Capability (Responsiveness); Capability (Flexibility); and Capability (Competence). Each of these dependencies has three accompanying facets (or sub-dependencies), where the provision of these affects the way in which an organisation is able to operate. For example, Capability (Responsiveness), is dependent on an organisation's ability to 'sense', 'react' and 'recover' to market forces and conditions. Whereas, Capability (Flexibility) is dependent on the organisation's ability to be flexible and responsive, using 'Human Flexibility', 'ICT Flexibility' and 'Process Flexibility' as key response levers. Finally, Capability (Competence) is dependent on an organisation's ability to compile appropriate competence in 'Leadership', 'Management' and 'Strategy' in order to effectively compete in the market. The bidirectional forces of Strategic Alliances, Uncertainty, Temporal Vectors and Contextual Climate are seen as context anchors; where respondents are able to add tacit knowledge from personal experiences to add granularity and data richness to decisions (Lambert and Loiselle, 2008). These forces include a wide range of issues, including: client awareness and behaviour; impact of time on decision making; knowledge of markets (including financial structuring); the impact of risk on the business; and meso/macro analysis of supply chain partners cognisant of vertical/lateral integration.

6. CONCLUSION

This paper presented a series of AEC performance challenges. It also highlighted the need to capture core priorities which impinged or influenced organisational success. In this respect, the effect of employee stakeholder engagement on the performance of construction organisations was examined. This paper adopted a psychosocial approach to evaluate employee perception and role engagement on organisational performance. The research methodological approach engaged 30 domain experts from three large AEC companies operating in Turkey, representing the views of Top Management, Middle Management, and First Line Management. Research findings highlighted a number of important factors affecting organisational performance. These findings included the need to: understand the impact and pervasiveness of i) Capability (Responsiveness); ii) Capability (Flexibility);

and iii) Capability (Competence). One of the several challenges highlighted in this study was the myriad of roles and entrenched thinking presented by siloed positioning (seniority levels). It is accepted that there are much wider implications to consider here regarding population sample size, and the correlation of conjoined thought. It does however present new insight into “position thinking” or thinking within a particular sphere of influence associated with managerial position. Communication and clarity of strategy, roles and process were seen as the main challenges affecting organisational performance. It was also acknowledged that intrinsic psychosocial factors had not been readily embraced by any of the three case study organisations. However, while respondents were aware of the need to embed psychosocial factors into organisational systems and processes, they were unaware of specific mechanisms for doing so. That being said, they had significant knowledge of the internal and external factors that directly or indirectly affected the business, along with the psychosocial factors needed to help deliver strategy.

The impact of psychosocial diffusion factors on organisational performance was presented through a relational model for discussion. This identified three core dimensions: i) the need to be responsive; ii) the need to be flexible; and iii) the need to have appropriate competence in place to compete and survive. However, no attempt has been made to test or validate this model from a generalisability or repeatability perspective. The findings from this research are purely bound to the sample frame in question. Similarly, no attempt has been made to undertake detailed cross-analysis/correlation to support internal/external consistency, validity or reliability. Given this, further work is suggested through the application of a multi-perspective lens. It is also proffered that both cognate and non-cognate cross-case comparisons could be used to refine this model, especially in sectors such as aerospace, pharmaceuticals and manufacturing – as evidence suggests that these industries have started to embed psychosocial diffusion factors into organisational strategy. This type of thinking would be particularly useful in AEC, especially considering the facets of strategic alliances, uncertainty/risk, temporal vectors, client behaviour, and the different contextual climates involved.

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Table 1. Case Study Company Details

	Turnover \$USD	Overview
Company 'A'	590m	One of the pioneering contractors in the Turkish Construction Industry. Core operations include: construction; housing; public service buildings; refineries; chemical and petrochemical/power/industrial plants; pipelines, and transportation. Operating remits include: Turkey; Russia (The Russian Federation, Kazakhstan, Turkmenistan etc.); and Middle East and North Africa region.
Company 'B'	833m	One of the largest contractors in Turkey. Core operations include: construction, heavy civil engineering works, refineries and petrochemical/industrial/power plants, pipelines, marine structures and electrical/communication works. Operating remits include: Turkey; the Middle East; North Africa; Caucasia and Central Asia; East and Central Europe.
Company 'C'	540m	A construction holding group company in Turkey. Core operations include: construction; marine works; bridges; highways; tunnels; oil/gas power plants; power transmission lines; dams; residential-commercial-industrial buildings; water/sewage treatment plants; urban infrastructure; engineering and construction management services. Operating remits span 24 counties, including: Turkey; the Middle East and North Africa region.

Table 2. Actor Distribution and Experience

Management Level	Experience (Years)					Total
	0-5	6-10	11-15	16-20	21+	
Top Management	-	-	-	1	5	6
Middle Management	1*	-	4	3	4	12
First Line Management	6	5	1	-	-	12
Total	7	3	5	4	9	30

*previous work experience from another sector

Table 3 Top Management, Middle Management, and First Line Management: Collective Findings

Organisational Performance Capability	TM		MM		FLM		TOTAL	
	Rank	REI	Rank	REI	Rank	REI	Rank	REI
Ability to be aware of emerging technologies, trends and changes in the industry.	19.5	0.867	12	0.800	9	0.700	10	0.773
Ability to be aware of level of organisation's resources.	26	0.900	10	0.783	14	0.733	16	0.787
Ability to be aware of organisation's external connectivity.	8.5	0.800	17	0.817	11.5	0.717	11.5	0.773
Ability to be aware of organisation's internal connectivity.	6	0.767	4	0.733	24	0.800	9	0.767
Ability to analyse the potential risks of change on the organisation.	3.5	0.767	5	0.750	3	0.633	3	0.707
Ability to analyse the potential consequences of change on organisation.	19.5	0.867	15	0.817	20	0.767	20	0.807
Ability to define a clear strategic vision for organisation.	23.5	0.867	14	0.800	17	0.750	18	0.793
Ability to direct the organisation in sudden change and crisis.	19.5	0.867	25	0.850	29	0.883	28	0.867
Ability to manage knowledge efficiently.	11.5	0.800	7	0.750	18	0.750	7	0.760
Ability to ensure successful decisions by sharing knowledge efficiently.	8.5	0.767	9	0.783	21	0.767	11.5	0.773
Ability to make tough decisions quickly.	1	0.633	1	0.667	1	0.600	1	0.633
Authorise staff to make decisions in case of sudden changes.	11.5	0.800	8	0.767	22	0.800	14	0.787
Ability to assess recovery needs in sudden/unpredicted change.	14.5	0.833	21	0.833	11.5	0.717	15	0.787
Ability to assess recovery needs in planned change.	6	0.767	20	0.833	13	0.733	13	0.780
Ability to quickly reorganise the resources in sudden change.	3.5	0.767	6	0.750	5	0.667	5	0.720
Ability to implement a recovery plan.	2	0.700	2	0.683	4	0.633	2	0.667
Ability to develop a range of possible solutions in a sudden change.	19.5	0.867	18	0.833	26	0.833	26	0.840
Ability to develop range of possible solutions in planned change.	29	0.933	29	0.867	28	0.867	29	0.880
Ability to provide solutions within optimum time and cost difference in sudden change.	6	0.767	3	0.717	15.5	0.750	6	0.740
Ability to provide solutions within optimum time and cost difference in planned change.	26	0.900	27	0.850	27	0.833	27	0.853
Development of an innovative culture.	29	0.933	16.5	0.817	7	0.683	17	0.787
Development of a collaborative culture.	11.5	0.800	13	0.800	10	0.717	8	0.767
Ability to reengineer the processes.	19.5	0.867	28	0.850	15.5	0.750	21	0.813
Ability to clarify changes in roles and responsibilities.	14.5	0.833	19	0.833	23	0.800	22	0.820
Ability to develop powerful internal communication.	23.5	0.867	24	0.850	32	0.933	30	0.887
Ability to develop powerful external communication.	19.5	0.867	30.5	0.900	30.5	0.900	31	0.893
Ability to align IT strategy with business strategy.	26	0.900	26	0.850	19	0.767	24	0.827
Ability to develop a diffusion programme for new technology.	29	0.933	32	0.900	6	0.683	23	0.820
Ability to employ IT and innovation ready staff.	16	0.833	22	0.833	25	0.817	25	0.827
Ability to encourage staff to use new technology.	11.5	0.800	11	0.783	2	0.600	4	0.713

Ability to improve staff skill, knowledge and attitude towards new technology.	32	1.000	30.5	0.900	30.5	0.900	32	0.920
Ability to improve top management's knowledge about new technology.	31	0.967	23	0.833	8	0.683	19	0.800

Notes: TM-Top Management, MM-Middle Management, FLM-First Line Management; REI-Relative Existence Index

Table 4 Top Management: Mean Score, Standard Deviation and REI Findings

Organisational Performance Capability	Top Management			
	MS	SD	REI	Rank
Ability to be aware of emerging technologies, trends and changes in the industry.	4.333	0.516	0.867	19.5
Ability to be aware of level of organisation's resources.	4.500	0.548	0.900	26
Ability to be aware of organisation's external connectivity.	4.000	1.095	0.800	8.5
Ability to be aware of organisation's internal connectivity.	3.833	0.753	0.767	6
Ability to analyse the potential risks of change on the organisation.	3.833	0.408	0.767	3.5
Ability to analyse the potential consequences of change on organisation.	4.333	0.516	0.867	19.5
Ability to define a clear strategic vision for organisation.	4.333	0.816	0.867	23.5
Ability to direct the organisation in sudden change and crisis.	4.333	0.516	0.867	19.5
Ability to manage knowledge efficiently.	4.000	0.632	0.800	11.5
Ability to ensure successful decisions by sharing knowledge efficiently.	3.833	0.983	0.767	8.5
Ability to make tough decisions quickly.	3.167	0.753	0.633	1
Authorise staff to make decisions in case of sudden changes.	4.000	0.632	0.800	11.5
Ability to assess recovery needs in sudden/unpredicted change.	4.167	0.408	0.833	14.5
Ability to assess recovery needs in planned change.	3.833	0.753	0.767	6
Ability to quickly reorganise the resources in sudden change.	3.833	0.408	0.767	3.5
Ability to implement a recovery plan.	3.500	0.548	0.700	2
Ability to develop a range of possible solutions in a sudden change.	4.333	0.516	0.867	19.5
Ability to develop range of possible solutions in planned change.	4.667	0.516	0.933	29
Ability to provide solutions within optimum time and cost difference in sudden change.	3.833	0.753	0.767	6
Ability to provide solutions within optimum time and cost difference in planned change.	4.500	0.548	0.900	26
Development of an innovative culture.	4.667	0.516	0.933	29
Development of a collaborative culture.	4.000	0.632	0.800	11.5
Ability to reengineer the processes.	4.333	0.516	0.867	19.5
Ability to clarify changes in roles and responsibilities.	4.167	0.408	0.833	14.5
Ability to develop powerful internal communication.	4.333	0.816	0.867	23.5
Ability to develop powerful external communication.	4.333	0.516	0.867	19.5
Ability to align IT strategy with business strategy.	4.500	0.548	0.900	26
Ability to develop a diffusion programme for new technology.	4.667	0.516	0.933	29
Ability to employ IT and innovation ready staff.	4.167	0.753	0.833	16
Ability to encourage staff to use new technology.	4.000	0.632	0.800	11.5
Ability to improve staff skill, knowledge and attitude towards new technology.	5.000	0.000	1.000	32
Ability to improve top management's knowledge about new technology.	4.833	0.408	0.967	31

Notes: MS- Mean Score of the existence where (1) strongly disagree (2) disagree (3) neutral (4) agree and (5) strongly agree;
SD- Standard Deviation; REI-Relative Existence Index; Rank- Priority need ranking

Table 5 Middle Management: Mean Score, Standard Deviation and REI Findings

Organisational Performance Capability	Middle Management			
	MS	SD	REI	Rank
Ability to be aware of emerging technologies, trends and changes in the industry.	4.000	0.674	0.800	12
Ability to be aware of level of organisation's resources.	3.917	1.073	0.783	10
Ability to be aware of organisation's external connectivity.	4.083	0.996	0.817	17
Ability to be aware of organisation's internal connectivity.	3.667	1.044	0.733	4
Ability to analyse the potential risks of change on the organisation.	3.750	0.835	0.750	5
Ability to analyse the potential consequences of change on organisation.	4.083	0.718	0.817	15
Ability to define a clear strategic vision for organisation.	4.000	0.965	0.800	14
Ability to direct the organisation in sudden change and crisis.	4.250	0.515	0.850	25
Ability to manage knowledge efficiently.	3.750	1.055	0.750	7
Ability to ensure successful decisions by sharing knowledge efficiently.	3.917	0.937	0.783	9
Ability to make tough decisions quickly.	3.333	1.044	0.667	1
Authorise staff to make decisions in case of sudden changes.	3.833	0.739	0.767	8
Ability to assess recovery needs in sudden/unpredicted change.	4.167	0.996	0.833	21
Ability to assess recovery needs in planned change.	4.167	0.985	0.833	20
Ability to quickly reorganise the resources in sudden change.	3.750	0.985	0.750	6
Ability to implement a recovery plan.	3.417	1.030	0.683	2
Ability to develop a range of possible solutions in a sudden change.	4.167	0.389	0.833	18
Ability to develop range of possible solutions in planned change.	4.333	0.492	0.867	29
Ability to provide solutions within optimum time and cost difference in sudden change.	3.583	0.754	0.717	3
Ability to provide solutions within optimum time and cost difference in planned change.	4.250	0.718	0.850	27
Development of an innovative culture.	4.083	0.996	0.817	17
Development of a collaborative culture.	4.000	0.900	0.800	13
Ability to reengineer the processes.	4.250	0.754	0.850	28
Ability to clarify changes in roles and responsibilities.	4.167	0.853	0.833	19
Ability to develop powerful internal communication.	4.250	0.492	0.850	24
Ability to develop powerful external communication.	4.500	0.522	0.900	30.5
Ability to align IT strategy with business strategy.	4.250	0.577	0.850	26
Ability to develop a diffusion programme for new technology.	4.500	0.900	0.900	32
Ability to employ IT and innovation ready staff.	4.167	1.084	0.833	22
Ability to encourage staff to use new technology.	3.917	1.206	0.783	11
Ability to improve staff skill, knowledge and attitude towards new technology.	4.500	0.522	0.900	30.5
Ability to improve top management's knowledge about new technology.	4.167	1.311	0.833	23

Notes: MS- Mean Score of the existence where (1) strongly disagree (2) disagree (3) neutral (4) agree and (5) strongly agree; SD- Standard Deviation; REI-Relative Existence Index; Rank- Priority need ranking

Table 6 First Line Management: Mean Score, Standard Deviation and REI Findings

Organisational Performance Capability	First Line Management			
	MS	SD	REI	Rank
Ability to be aware of emerging technologies, trends and changes in the industry.	3.500	0.674	0.700	9
Ability to be aware of level of organisation's resources.	3.667	1.073	0.733	14
Ability to be aware of organisation's external connectivity.	3.583	0.996	0.717	11.5
Ability to be aware of organisation's internal connectivity.	4.000	1.044	0.800	24
Ability to analyse the potential risks of change on the organisation.	3.167	0.835	0.633	3
Ability to analyse the potential consequences of change on organisation.	3.833	0.718	0.767	20
Ability to define a clear strategic vision for organisation.	3.750	0.965	0.750	17
Ability to direct the organisation in sudden change and crisis.	4.417	0.515	0.883	29
Ability to manage knowledge efficiently.	3.750	1.055	0.750	18
Ability to ensure successful decisions by sharing knowledge efficiently.	3.833	0.937	0.767	21
Ability to make tough decisions quickly.	3.000	1.044	0.600	1
Authorise staff to make decisions in case of sudden changes.	4.000	0.739	0.800	22
Ability to assess recovery needs in sudden/unpredicted change.	3.583	0.996	0.717	11.5
Ability to assess recovery needs in planned change.	3.667	0.985	0.733	13
Ability to quickly reorganise the resources in sudden change.	3.333	0.985	0.667	5
Ability to implement a recovery plan.	3.167	1.030	0.633	4
Ability to develop a range of possible solutions in a sudden change.	4.167	0.389	0.833	26
Ability to develop range of possible solutions in planned change.	4.333	0.492	0.867	28
Ability to provide solutions within optimum time and cost difference in sudden change.	3.750	0.754	0.750	15.5
Ability to provide solutions within optimum time and cost difference in planned change.	4.167	0.718	0.833	27
Development of an innovative culture.	3.417	0.996	0.683	7
Development of a collaborative culture.	3.583	0.900	0.717	10
Ability to reengineer the processes.	3.750	0.754	0.750	15.5
Ability to clarify changes in roles and responsibilities.	4.000	0.853	0.800	23
Ability to develop powerful internal communication.	4.667	0.492	0.933	32
Ability to develop powerful external communication.	4.500	0.522	0.900	30.5
Ability to align IT strategy with business strategy.	3.833	0.577	0.767	19
Ability to develop a diffusion programme for new technology.	3.417	0.900	0.683	6
Ability to employ IT and innovation ready staff.	4.083	1.084	0.817	25
Ability to encourage staff to use new technology.	3.000	1.206	0.600	2
Ability to improve staff skill, knowledge and attitude towards new technology.	4.500	0.522	0.900	30.5
Ability to improve top management's knowledge about new technology.	3.417	1.311	0.683	8

Notes: MS- Mean Score of the existence where (1) strongly disagree (2) disagree (3) neutral (4) agree and (5) strongly agree; SD- Standard Deviation; REI-Relative Existence Index; Rank- Priority need ranking